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(71) Applicant(s)

NEC Corporation  
(Incorporated in Japan)  
7-1, Shiba 5-chome, Minato-ku,  
Tokyo 108-8001, Japan

(72) Inventor(s)

Keiichi Hayashi

(74) Agent and/or Address for Service

Reddie & Grose  
16 Theobalds Road, LONDON, WC1X 8PL,  
United Kingdom

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UK CL (Edition V ) H4L

INT CL<sup>7</sup> H04Q

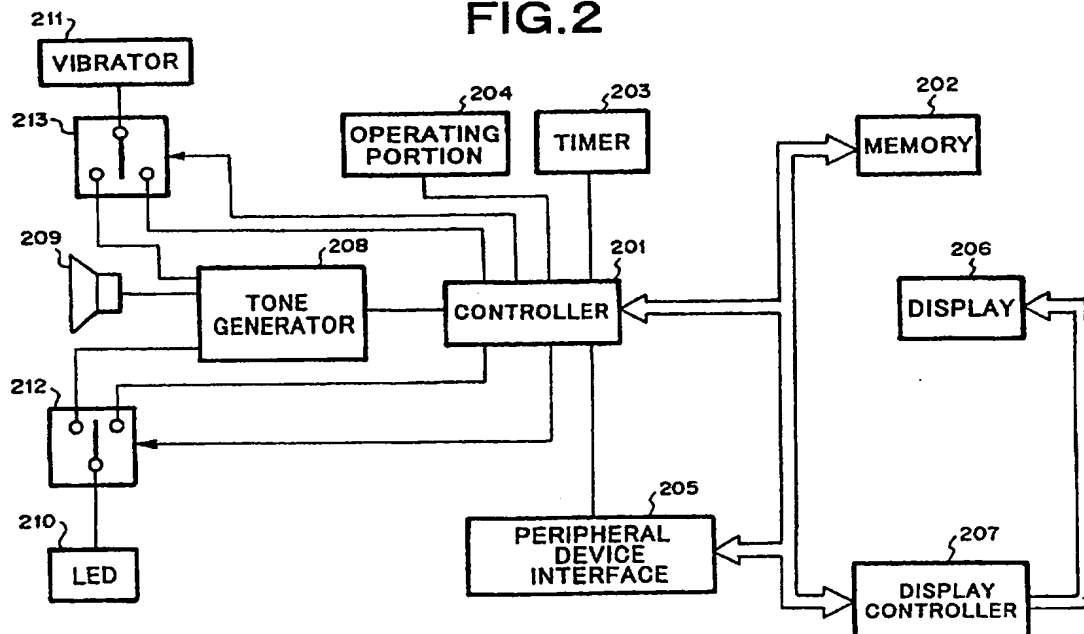
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(54) Abstract Title

**Sounding music accompanied by vibration, for eg a phone terminal**

(57) A speaker 209 plays a tune and in synchronism with it a vibrator device 211 is turned on and off. The musical data may be received through a cellular network such as the Internet. The mobile may download call reception melodies from a www server, such that the user can identify call reception, who is calling, and what is received, from the pattern of vibration of the mobile.

FIG.2



GB 2 380 908 A

FIG. 1

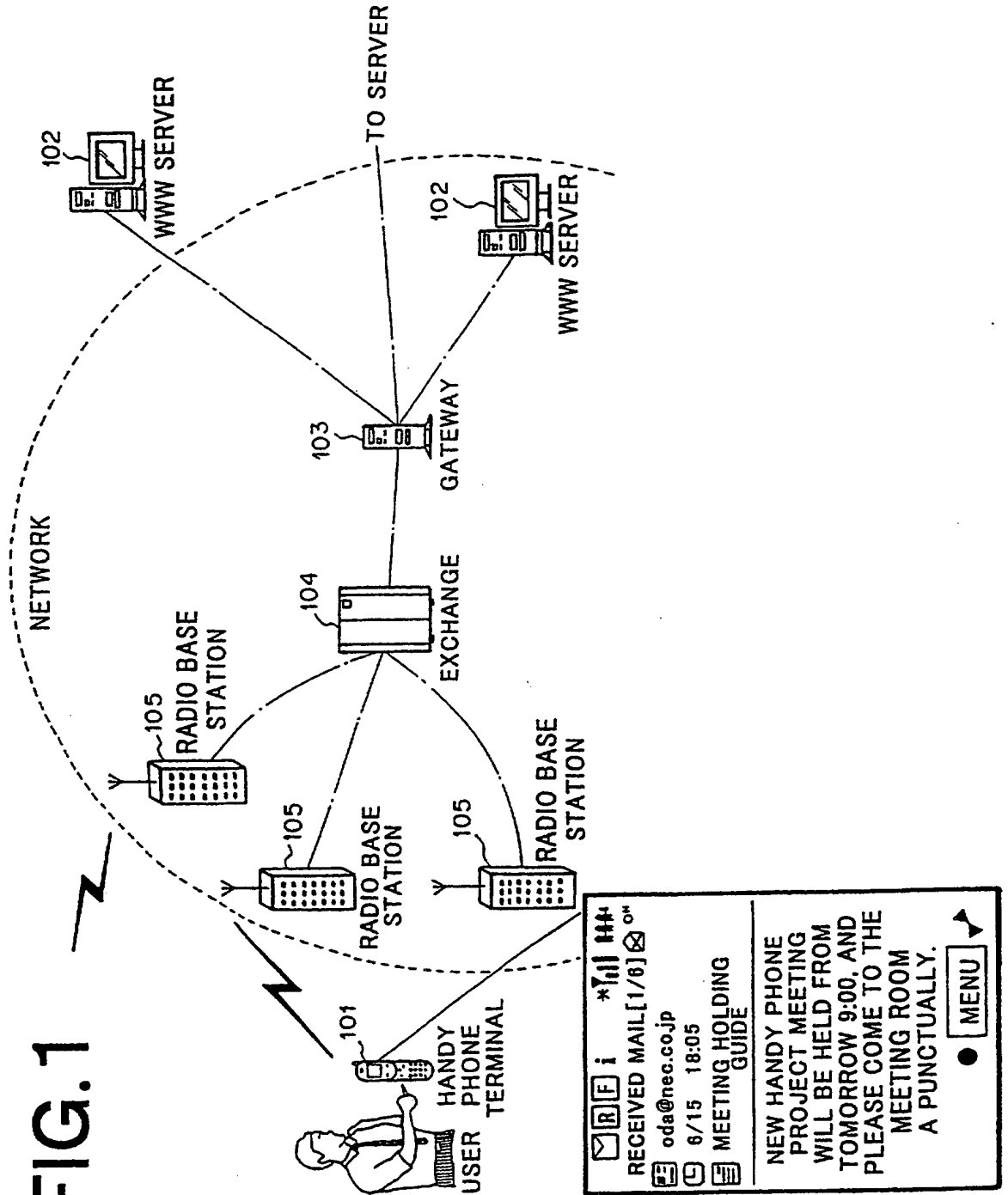


FIG. 2

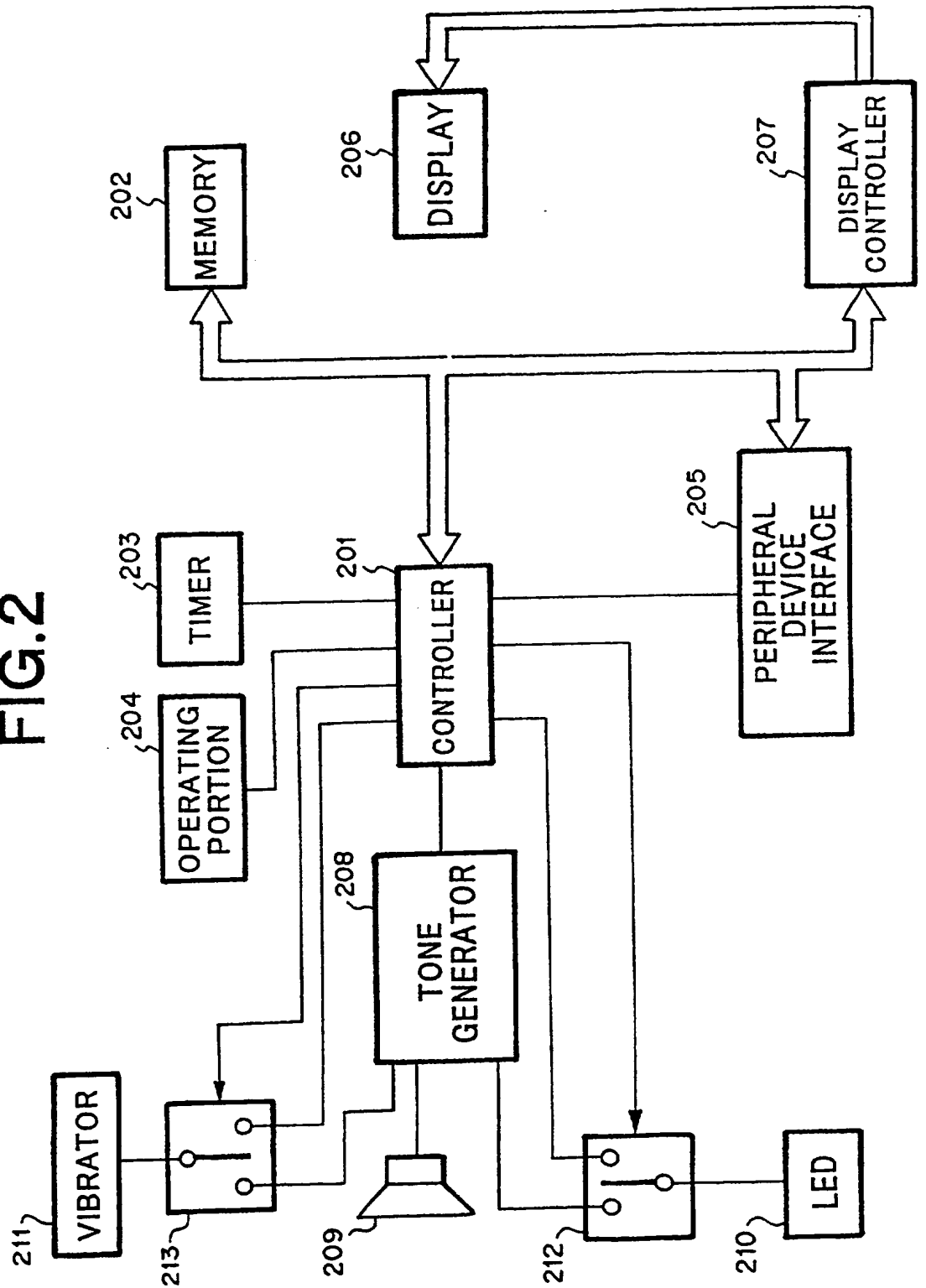


FIG.3

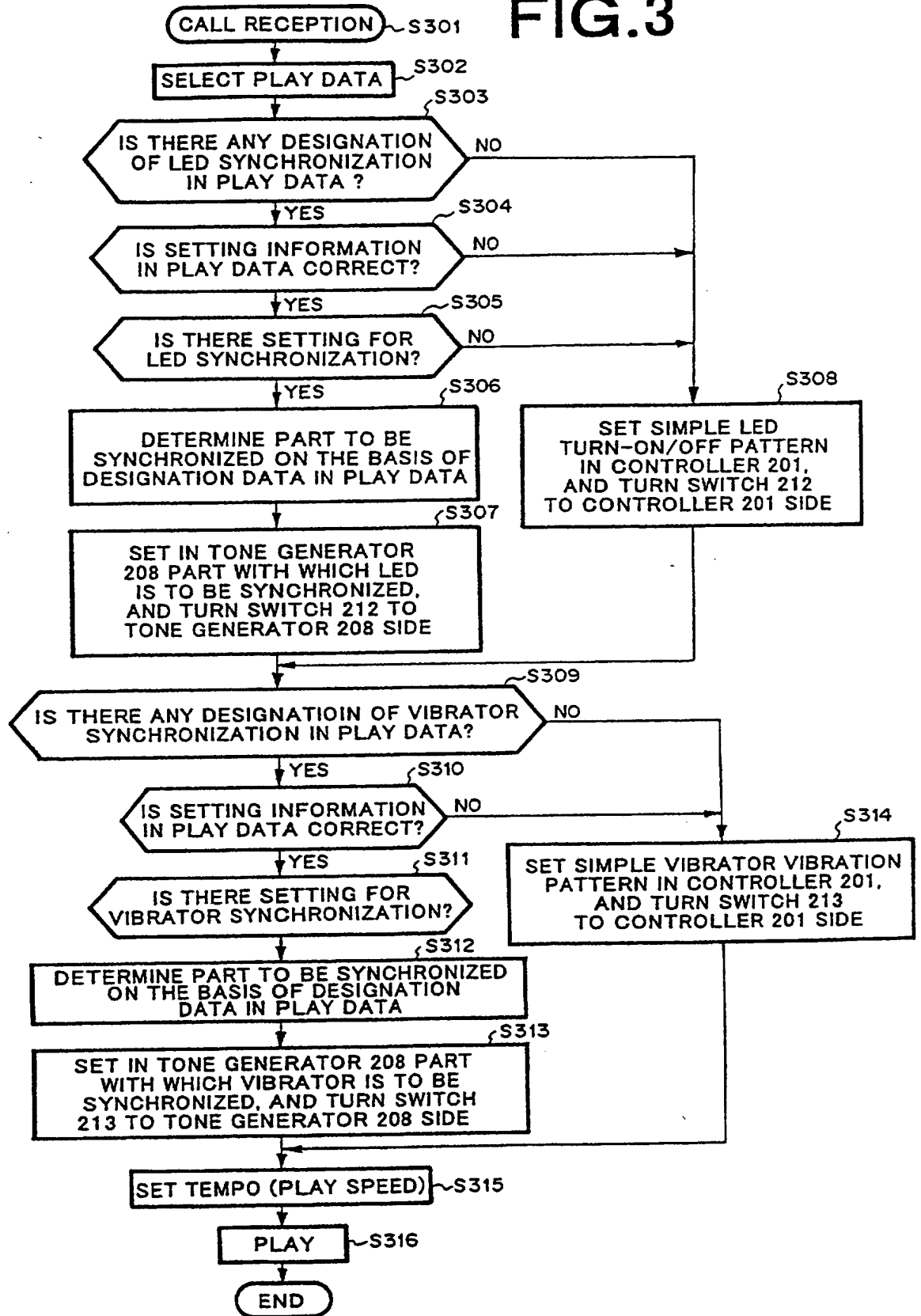
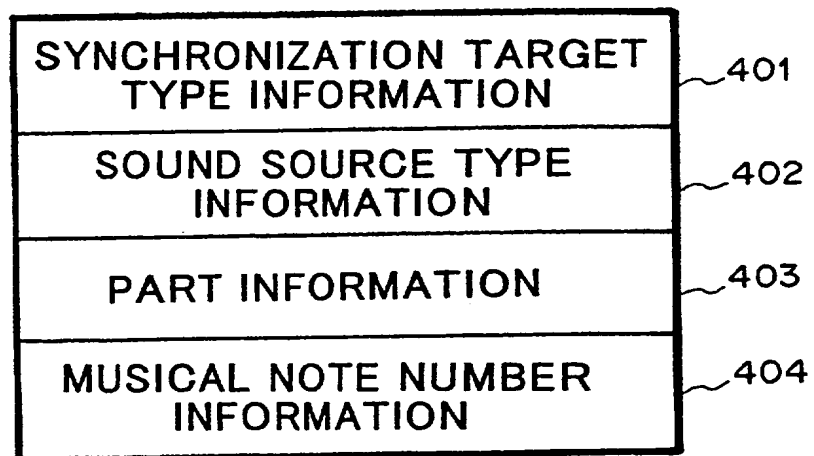


FIG.4



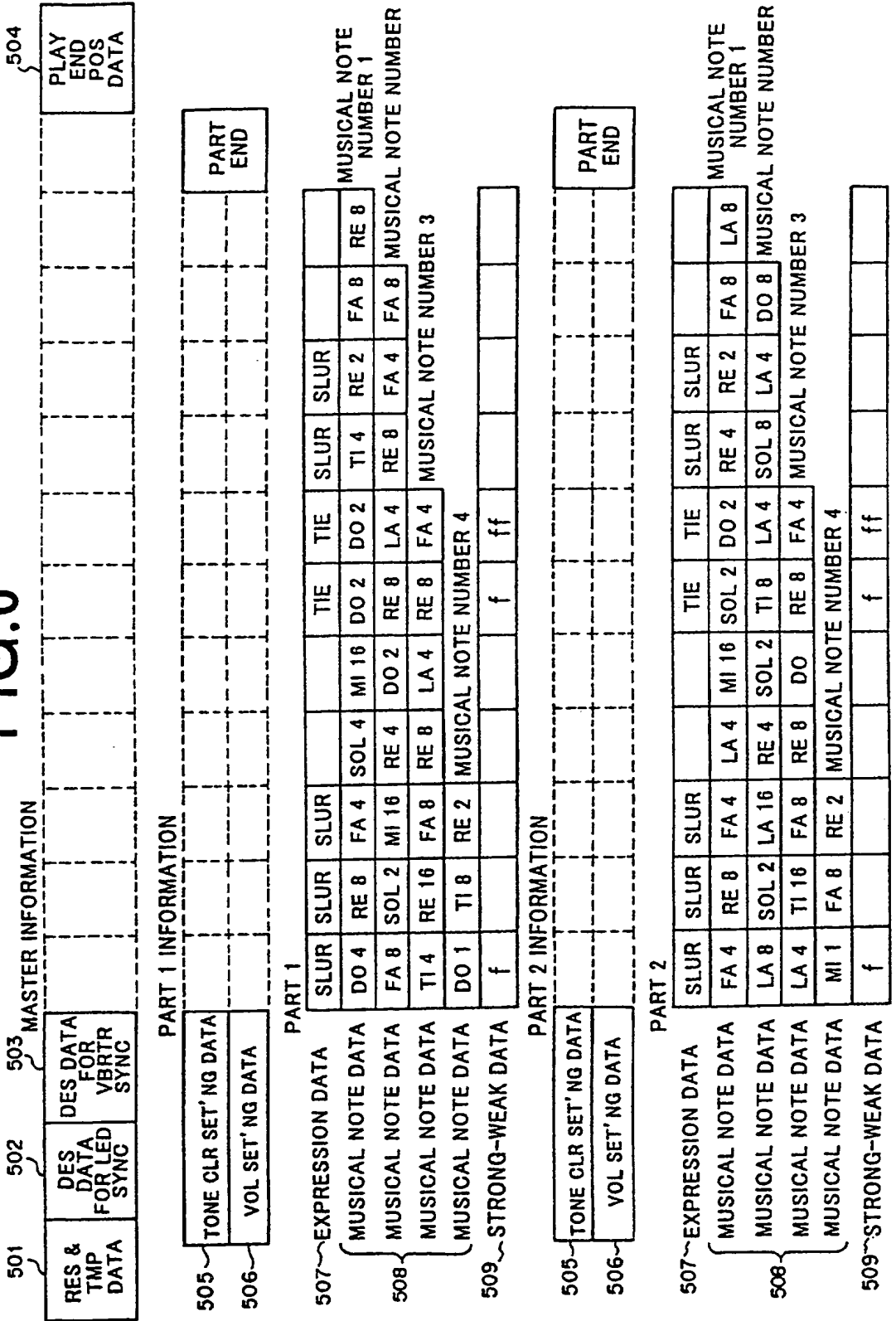
|                |                       |                         |  |  |  |  |  |  |  |  |  |  |                   |
|----------------|-----------------------|-------------------------|--|--|--|--|--|--|--|--|--|--|-------------------|
| 501            | 502                   | 503, MASTER INFORMATION |  |  |  |  |  |  |  |  |  |  | 504               |
| RES & TMP DATA | DES DATA FOR LED SYNC | DES DATA FOR VBRTR SYNC |  |  |  |  |  |  |  |  |  |  | PLAY END POS DATA |

|                    |                      |       |       |      |      |      |      |      |      |      |      |      |  |
|--------------------|----------------------|-------|-------|------|------|------|------|------|------|------|------|------|--|
| PART 1 INFORMATION |                      |       |       |      |      |      |      |      |      |      |      |      |  |
| 505                | TONE CLR SET'NG DATA |       |       |      |      |      |      |      |      |      |      |      |  |
| 506                | VOL SET'NG DATA      |       |       |      |      |      |      |      |      |      |      |      |  |
| PART 1             |                      |       |       |      |      |      |      |      |      |      |      |      |  |
| 507                | EXPRESSION DATA      |       |       |      |      |      |      |      |      |      |      |      |  |
| 508                | SLUR                 | SLUR  | SLUR  | FA 4 |      |      |      |      |      |      |      |      |  |
| 509                | DO 4                 | RE 8  | FA 4  |      |      |      |      |      |      |      |      |      |  |
| PART 2 INFORMATION |                      |       |       |      |      |      |      |      |      |      |      |      |  |
| 505                | TONE CLR SET'NG DATA |       |       |      |      |      |      |      |      |      |      |      |  |
| 506                | VOL SET'NG DATA      |       |       |      |      |      |      |      |      |      |      |      |  |
| PART 2             |                      |       |       |      |      |      |      |      |      |      |      |      |  |
| 507                | EXPRESSION DATA      |       |       |      |      |      |      |      |      |      |      |      |  |
| 508                | FA 8                 | SOL 2 | MI 16 |      | SLUR | SLUR | SLUR |      |      |      |      |      |  |
| 509                |                      |       |       | mp   |      |      |      | DO 2 | TI 4 | RE 2 | FA 8 | RE 8 |  |
| PART 3 INFORMATION |                      |       |       |      |      |      |      |      |      |      |      |      |  |
| 505                | TONE CLR SET'NG DATA |       |       |      |      |      |      |      |      |      |      |      |  |
| 506                | VOL SET'NG DATA      |       |       |      |      |      |      |      |      |      |      |      |  |
| PART 3             |                      |       |       |      |      |      |      |      |      |      |      |      |  |
| 507                | EXPRESSION DATA      |       |       |      |      |      |      |      |      |      |      |      |  |
| 508                | TI 4                 | RE 16 | FA 8  |      | RE 8 | LA 4 |      |      |      |      |      |      |  |
| 509                |                      |       |       |      |      |      | f    |      |      |      |      |      |  |
| PART 4 INFORMATION |                      |       |       |      |      |      |      |      |      |      |      |      |  |
| 505                | TONE CLR SET'NG DATA |       |       |      |      |      |      |      |      |      |      |      |  |
| 506                | VOL SET'NG DATA      |       |       |      |      |      |      |      |      |      |      |      |  |
| PART 4             |                      |       |       |      |      |      |      |      |      |      |      |      |  |
| 507                | EXPRESSION DATA      |       |       |      |      |      |      |      |      |      |      |      |  |
| 508                | DO 1                 | TI 8  | RE 2  |      |      |      |      |      |      |      |      |      |  |
| 509                | STRONG-WEAK DATA     |       |       |      |      |      |      |      |      |      |      |      |  |

FIG.5

# FIG. 6.



**SYSTEM AND METHOD FOR SOUNDING MUSIC  
ACCOMPANIED BY VIBRATION, FOR E.G. A PHONE TERMINAL**

**BACKGROUND OF THE INVENTION**

5           The present invention relates to a system and method for sounding music accompanied by vibration, for use for example in a handy (mobile) phone terminal, and particularly in such a phone terminal having a function of indicating reception of a call by a call-reception melody and by vibrating means such as a vibrator or the like. Further, the present invention relates to a corresponding  
10   method

          There are known some kinds of handy (mobile) phones each having a function of indicating reception of a call by simultaneously sounding a call-reception melody (a musical ring tone) and vibrating a vibrator when a call is received.

15           However, the call-reception melodies which can be sounded simultaneously with vibrating a vibrator as described above are limited to fixed call-reception melodies registered with each phone terminal in advance, and data describing the pattern of turning-on/off the vibrator are required to be defined in conformity with these fixed call-reception melodies. Further, when a phone terminal downloads  
20   play data for making the phone play a call-reception melody from a server such as a WWW (World Wide Web) server by utilizing a network service using a network such as the Internet in order to make a musical call-reception sound on the basis of the downloaded play data at the time of reception of a call, the vibration pattern of the vibrator cannot be defined, and the vibrator vibrates in a simple pattern, so that  
25   the reception of a call can be indicated to a user by only a monotonous pattern. Therefore, when the call-reception sound is eliminated, there occurs the problem that who is calling or what is received cannot be identified on the basis of the vibration pattern of the vibrator.



That is, with respect to the known phones, when a melody is sounded when a call or data are received, the vibration pattern of the vibrator operates with fixed patterns preset in the phone terminal or in synchronization with melody call-reception sounds registered with the phone terminal in advance. Therefore, with respect to play data downloaded from a network, the vibrator cannot be operated in synchronization with the melodies of the downloaded play data, and only a single and monotonous pattern of operation of the vibrator can be performed. Further, if the user switches off the call-reception sound which normally enables the user to identify the call originator on the basis of the melody played when a call is received, the call originator cannot be identified from the vibrator when the call is received, because the operation pattern of the vibrator is a simple one.

#### SUMMARY OF THE INVENTION

According to a first aspect of the present invention, there is provided a system for sounding music accompanied by vibration comprising a speaker for sounding music comprising plural musical portions; a vibrator for causing vibration; means for having said speaker sound said music, on the basis of music data of said music comprising said plural musical portions, said music data being included in play data containing both said music data of said music comprising said plural musical portions to be played by said speaker and designation data for designating a specific part among said plural musical portions, said specific part being intended to be accompanied by vibration caused by said vibrator; and turn-on/off means for turning said vibrator on or off in synchronization with a sound of said specific part, on the basis of said designation data for designating said specific part.

In the system for sounding music accompanied by vibration, the play data may be received through a network, which may be the Internet.

In the system for sounding music accompanied by vibration, each musical portion may comprises plural constituent components, the designation data may

designate a specific constituent component among the plural constituent components of the specific part, the specific constituent component being intended to be accompanied by vibration caused by the vibrator, and the turn-on/off means may turn the vibrator on or off in synchronization with a sound of the specific constituent component of the specific part, on the basis of the designation data for designating the specific constituent component of the specific part.

The system for sounding music accompanied by vibration may be incorporated in a mobile phone terminal.

The invention also provides a corresponding method.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail, by way of example, with reference to the drawings, in which:

FIG. 1 is a diagram showing a phone terminal according to an embodiment of the present invention, and a device needed when the phone terminal downloads play data;

FIG. 2 is a block diagram showing the construction of the phone terminal according to the embodiment of the present invention;

FIG. 3 is a flowchart showing the setting operation carried out by a controller 201 for taking or not taking synchronization between music play and each of LED and a vibrator after voices or data are received;

FIG. 4 is a diagram showing the format of indicating data according to the embodiment of the present invention;

FIG. 5 is a diagram showing the format of music data when each part comprises a single sound in the embodiment of the present invention; and

FIG. 6 is a diagram showing the format of play data when each part comprises plural sounds.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment according to the present invention will now be described with reference to the accompanying drawings.

5 An embodiment of the present invention is a handy (mobile) phone that has a WWW (World Wide Web) browser function; downloads play data having the music data of music comprising plural parts or musical portions (MIDI (Musical Instrument Digital Interference) data or the like) from a WWW server through a network such as the Internet; uses as call-reception sounds the music sounds played on the basis of the play data; and turns on or off an LED and/or turns on or off a  
10 vibrator in synchronization with a specific part of the musical sounds of indicated portions of the music. Here, a musical portion means a part of a main melody, a part of an auxiliary melody, a part of an accompaniment or the like. Further, the synchronization of the turn-on/off operation of the LED with the musical sound of a specific part means that the LED is turned on when the musical sound of the  
15 specific part is sounded and the LED is turned off when the musical sound of the specific part is not sounded. The synchronization of the vibration of the vibrator with the musical sound of a specific part means that the vibrator is vibrated when the musical sound of the specific part is sounded and the vibrator is stopped when the musical sound of the specific part is not sounded.

20 The parent application No. 0127835.7, publication GB-A-2371720, is directed to the operation of the LED in this way, and the present divisional application is directed to the operation of the vibrator.

The play data are extended in order to designate which LED should be synchronized with which portion of the musical sound in the musical sounds  
25 comprising the plural musical portions and/or with which portion of the musical sound in the musical sounds comprising the plural musical portions the vibrator should be synchronized. The thus extended play data contains designation data for making such a designation as described above. Even when the play data are MIDI data, the MIDI data is extended.

The phone terminal according to this embodiment is equipped with a tone generator for generating signals matched with musical notes of the musical sound of each musical portion in the play data when music is played.

5 All the operations of sounding music, turning on/off the LED and turning on/off the vibrator can be synchronized with one another on the basis of the play data. However, any one or more of these operations may be turned off by appropriate user's setting to the handy phone terminal.

Accordingly, musical sound is played in order to notify call-reception or the like, and the LED and/or the vibrator can be operated in synchronization with any  
10 part of the music, so that reception of a call can be notified to a user with the turn-on/off operation of the LED and/or vibration. Further, since the LED and/or the vibrator is operated in synchronization with any part, the type of call reception and the call originator can be identified even when the music is not played by the tone generator. That is, the user can identify call reception, who is calling, and  
15 what is received, from the pattern of LED illumination and/or vibration of the phone. In order to perform the identification, play data associated with call reception are switched in accordance with the type of call reception.

Next, the operation of the embodiment according to the present invention will be described in detail with reference to FIGS. 1 to 6.

20 Referring to FIG. 1, a handy (mobile) phone 101 downloads play data from a WWW server 102 through a gateway 103, an exchange 104 and a radio base station 105.

Referring to FIG. 2, the handy phone 101 comprises a controller 201, a memory 202, a timer 203, an operating portion 204, a peripheral device interface  
25 205, a display 206, a display controller 207, a tone generator 208, a speaker 209, an LED 210, a vibrator 211, and switches 212, 213.

The controller 201 comprises a microprocessor, etc., and controls the respective parts, such as the tone generator 208 of the phone, the switches 212, 213, etc., by executing programs stored in the memory 202. Further, the controller  
30 201 carries out a method as described below with reference to FIG. 3.

The memory 202 comprises a ROM and a RAM. The ROM is used to store the programs to be executed by the controller 201 and data needed to execute the programs, and the RAM is used to temporarily store data. The RAM is backed up by a battery, and downloaded play data are stored in the RAM. The timer 203  
5 comprises a counter or the like, and the timer 203 clocks the time and measures the lapse of a predetermined time and notifies the time and the lapse of the time to the controller 201.

The operating portion 204 comprises plural keys, and accepts an input of a telephone number and operations for various kinds of settings from the user. The  
10 peripheral device interface 205 serves to establish the interface between the phone and a personal computer or the like. The display 206 comprises LCD (Liquid Crystal Display) or the like, and displays a telephone number, the time, and characters to establish the interface with the user. The display controller 207 controls the display 206 for displaying the characters, etc. thereon, and the display  
15 controller 207 comprises a character generator, etc.

On the basis of the play data, the tone generator 208 makes the speaker 209 play the music sound of each part, makes the LED 210 turn on/off in such a way that the turn- on/off operation is synchronized with a specific musical portion, and makes the vibrator 211 vibrate in such a way that the vibration is synchronize with  
20 a specific part. The speaker 209 makes sounds on the basis of an electrical signal transmitted from the tone generator 208.

The LED 210 emits light on the basis of an electrical signal input from the tone generator 208 or from the controller 201, through the switch 212, and the vibrator 211 vibrates on the basis of an electrical signal input from the tone  
25 generator 208 or from the controller 201, through the switch 213. The switch 212 switches the LED 210 either to the tone generator 208 or the controller 201. The switch 213 switches the vibrator 211 either to the tone generator 208 or the controller 201.

Next, the setting operation, which is carried out by the controller 201, for  
30 sounding music and synchronizing or non-synchronizing the on/off operation of

the LED 210 and/or the vibrator 211 with the music when a voice call or a data call is received will be described with reference to the flowchart of FIG. 3.

When the phone 101 receives a voice call or a data call (step S301), the controller 201 selects the play data associated with the call originator (step S302).  
5 Subsequently, the controller 201 determines whether or not a designation for synchronizing the turn-on/off operation of the LED with the musical sound is contained in the play data in which the music data to be played is contained (step S303). If the determination of step 303 is negative, that is, if there is no designation of the LED synchronization, a simple LED turn-on/off pattern for turning the LED  
10 on/off is set in the controller 201, and the switch 212 is switched to the controller 201 side (step S308).

If the determination of step 303 is positive, the controller 201 determines whether the designation data for the LED synchronization in the play data are correct or not (step S304). If the determination of the step S304 is negative, the  
15 processing goes to step S308.

If the determination of step S304 is positive, the controller 201 determines whether or not the setting to the phone indicates that the LED synchronization is enabled (step S305). If the determination of step S305 is negative, the processing goes to step S308.

20 If the determination of step S305 is positive, the musical portion with which the LED turn-on/off operation is to be synchronized is determined on the basis of the indicating data in the play data (step 306). Thereafter, the information on the musical portion thus determined with which the LED turn-on/off operation is to be synchronized is set in the tone generator 208, and the switch 212 is  
25 switched to the tone generator (208) side (step S307). When the musical portion with which the LED turn-on/off operation is to be synchronized is set in the tone generator 208, the tone generator 208 drives LED 210 to turn on/off when the tone generator 208 drives the speaker 209 to output the sound of the musical portion.

Subsequently, the controller 201 determines whether a designation for  
30 synchronizing the turn-on/off operation of the vibrator with the musical sound is

contained in the play data in which the music sound to be played is contained (step S309). If the determination of step S309 is negative, that is, if there is no designation of the vibrator synchronization, a simple vibrator turn-on/off pattern for the vibrator is set in the controller 201, and the switch 213 is switched to the controller 201 (step S314).

If the determination of step S309 is positive, the controller 201 determines whether the designation data for the vibrator synchronization in the play data are correct or not (step S310). If the determination of step S310 is negative, the processing goes to step S314.

If the determination of step S310 is positive, the controller 201 determines whether or not the setting to the phone indicates that the vibrator synchronization is enabled (step S311). If the determination of the step S311 is negative, the processing goes to step S314.

If the determination of step S311 is positive, the musical portion with which the vibrator turn-on/off operation is to be synchronized is determined on the basis of the indicating data in the play data (step S312). Thereafter, the information on the musical portion thus determined with which the vibrator turn-on/off operation is to be synchronized is set in the tone generator 208, and the switch 213 is switched to the tone generator (208) side (step S313). When the musical portion with which the vibration turn-on/off operation is to be synchronized is set in the tone generator 208, the tone generator 208 drives the vibrator 211 to turn on/off when the tone generator 208 drives the speaker 209 to output the sound of the musical portion.

Subsequently, the controller 201 sets the tempo (playing speed) of the musical sound in the tone generator 208 on the basis of the play data (step S315). Thereafter, the tone generator 208 sounds the music and, if necessary, drives the LED 210 and the vibrator 211 on the basis of the setting in step S307 or step 308, step S313 or step S314 and step S315 and the musical sound data in the play data (step S316).

If LED 210 is turned on or off in synchronization with a specific part of the music and/or the vibrator 211 is turned on or off in synchronization with a specific part of the music, the playing of the music sound from the speaker 209 may be stopped.

5           FIG. 4 shows the format of the indicating data contained in the play data. The indicating data are classified into two types, one of which is for the LED synchronization and the other of which is for the vibrator synchronization. However, these types have the same format.

10           Referring to FIG. 4, the indicating data contain synchronization target type information 401, sound source type information 402, part information 403, and musical note number information 404.

15           The synchronization target type information 401 identifies whether the indicating data are for the LED synchronization or the vibrator synchronization. The sound source type information 402 identifies whether the constituent sound per part is a single sound or plural sounds. The part information 403 is used to indicate the portion of the music with which the LED or the vibrator should be tuned, and the part information comprises an identifier of that musical portion. The musical note number information 404 is valid only if the constituent sound per part comprises plural sounds, and the musical note number indicates with which  
20           constituent sound in the part indicated by the part information 403 LED or the vibrator is to be synchronized.

FIG. 5 shows the format of the play data in a case where each part comprises a single sound, that is, a single component.

25           Referring to FIG. 5, this format contains resolution and tempo data 501, indicating data 502 for LED synchronization, indicating data 503 for vibrator synchronization, play end position data 504, tone color setting data 505, volume setting data 506, expression data 507, musical note data 508, and strong-weak data 509. The resolution and tempo data 501, the play end position data 504, the tone color setting data 505, the volume setting data 506, the expression data 507, the  
30           musical note data 508, and the strong-weak data 509 are conventional. The



indicating data 502 for the LED synchronization and the indicating data 503 for the vibrator synchronization are newly added, and these data have the format shown in FIG. 4.

FIG. 6 shows the format of play data in a case where each part comprises plural sounds, that is, plural components.

Referring to FIG. 6, this format contains resolution and tempo data 501, indicating data 502 for LED synchronization, indicating data 503 for vibrator synchronization, play end position data 504, tone color setting data 505, volume setting data 506, expression data 507, musical note data 508, and strong-weak data 509. The resolution and tempo data 501, the play end position data 504, the tone color setting data 505, the volume setting data 506, the expression data 507, the musical note data 508, and the strong-weak data 509 are conventional. The indicating data 502 for the LED synchronization and the indicating data 503 for the vibrator synchronization are newly added and these data have the format shown in FIG. 4.

There is the following difference between the format of FIG. 6 and the format of FIG. 5. In the format shown in FIG. 5, there is only single musical note data at the same timing per part, while in the format shown in FIG. 6, there are plural musical note data at the same timing per part. Further, there is a difference in a value of the sound source type information 402 in the indicating data 502, 503, and there is a difference that the musical note number information 404 is invalid or valid.

In the above-described embodiment, the indication of the call-reception in a phone (mobile) terminal is described. However, the present invention is not limited to this embodiment, and the present invention may be applied to a mail terminal, a game terminal, etc.

In the case where the present invention is applied to a mail terminal, the present invention may be applied to the identification of the mail transmitter when a mail is received, or the identification of the mail transmitter when a mail is opened.

In the case where the present invention is applied to a game terminal, the present invention may be applied to the identification of a specific game scene, or the output of effective sounds accompanied by LED turn-on/off or vibration/stopping of a vibrator.

5           As described above, according to the present system, when music downloaded from a server through a network is played when a call is received or the like, an LED can be turned on/off or a vibrator can be vibrated/stopped in synchronization with a specific portion of the music. Therefore, when such music is used to indicate reception of a call, the call originator can be also identified on  
10           the basis of the LED turn-on/off pattern and/or the vibrating/stopping pattern of the vibrator.

          Further, even if the handy phone is set so that no musical sound is emitted, the call originator can be identified on the basis of only the LED turn-on/off pattern and/or the vibrating/stopping pattern of the vibrator.

15           Still further, it is not necessary to provide the LED turn-on/off pattern data and the vibrating/stopping pattern data of the vibrator in addition to the music sound data, so that the memory capacity needed for the phone terminal can be reduced as compared with the case where these pattern data are required in addition  
          to the music sound data, and also the download time can be shortened.

CLAIMS

1. A system for sounding music accompanied by vibration comprising:  
a speaker for sounding music comprising plural musical portions;  
a vibrator for causing vibration;  
5 means for having said speaker sound said music, on the basis of music data of said music comprising said plural musical portions, said music data being included in play data containing both said music data of said music comprising said plural musical portions to be played by said speaker and designation data for designating a specific part among said plural musical portions, said specific part  
10 being intended to be accompanied by vibration caused by said vibrator; and  
turn-on/off means for turning said vibrator on or off in synchronization with a sound of said specific part, on the basis of said designation data for designating said specific part.
2. The system for sounding music accompanied by vibration as claimed in  
15 claim 1, wherein said play data are received through a network.
3. The system for sounding music accompanied by vibration as claimed in claim 2, wherein said network is the Internet.
4. The system for sounding a music accompanied by vibration as claimed in claim 1,  
20 wherein each musical portion comprises plural constituent components, wherein said designation data designate a specific constituent component among said plural constituent components of said specific part, said specific constituent component being intended to be accompanied by vibration caused by said vibrator, and  
25 wherein said turn-on/off means turns said vibrator on or off in synchronization with a sound of said specific constituent component of said

specific part, on the basis of said designation data for designating said specific constituent component of said specific part.

5. A phone terminal comprising said system for sounding music accompanied by vibration as claimed in any of claims 1 to 4.

5 6. The phone terminal as claimed in claim 5, wherein the vibration enables identification of call reception and/or who is calling and/or what is received.

7. A method for sounding music accompanied by vibration from an apparatus comprising a speaker for sounding music comprising plural musical portions, and a vibrator for emitting vibration, said method comprising:

10 a sounding step of having said speaker sound said music, on the basis of music data of said music comprising said plural musical portions, said music data being included in play data containing both said music data of said music comprising said plural musical portions to be played by said speaker and designation data for designating a specific part among said plural musical portions,  
15 said specific part being intended to be accompanied by vibration caused by said vibrator; and

a vibrating step of turning said vibrator on or off in synchronization with a sound of said specific part, on the basis of said designation data for designating said specific part.

20 8. The method for sounding music accompanied by vibration as claimed in claim 7, wherein said play data are received through a network.

9. The method for sounding music accompanied by vibration as claimed in claim 8, wherein said network is the Internet.

10. The method for sounding music accompanied by vibration as claimed in claim 9,

wherein each musical portion comprises plural constituent components,

wherein said designation data designate a specific constituent component

5 among said plural constituent components of said specific part, said specific constituent component being intended to be accompanied by said vibration caused by said vibrator, and

wherein said vibrating step turns said vibrator on or off in synchronization with a sound of said specific constituent component of said specific part, on the  
10 basis of said designation data for designating said specific constituent component of said specific part.

11. The method for sounding music accompanied by vibration as claimed in any of claims 7 to 10, wherein said method is used as a call-reception indicating method.

15 12. The method for sounding music accompanied by vibration as claimed in claim 11, wherein the method enables identification of who is calling and/or what is received.



INVESTOR IN PEOPLE

Application No: GB 0230064.8  
Claims searched: 1-12

Examiner: Robert Shorthouse  
Date of search: 31 January 2003

## Patents Act 1977 : Search Report under Section 17

### Documents considered to be relevant:

| Category | Relevant to claims | Identity of document and passage or figure of particular relevance  |
|----------|--------------------|---|
| X, P     | 1, 7               | US 2001/0023197 (SHIBATA) See abstract A1   |
| A        | -                  | JP 9191333 (NIPPON) See English language abstract   |
| A, E     | -                  | WO 02/00498 A1 (NAMIKI) See abstract  |
| A, E     | -                  | GB 2367723 A (NEC) See abstract   |
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| A        | -                  | BBC News "Mobiles get a sense of touch" 21 January 2003, Alfred Hermida, news.bbc.co.uk/1/hi/technology/2677813.stm |

### Categories:

|   |  |
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| X Document indicating lack of novelty or inventive step   | A Document indicating technological background and/or state of the art.  |
| Y Document indicating lack of inventive step if combined with one or more other documents of same category. | P Document published on or after the declared priority date but before the filing date of this invention.          |
| & Member of the same patent family  | E Patent document published on or after, but with priority date earlier than, the filing date of this application. |

### Field of Search:

Search of GB, EP, WO, & US patent documents classified in the following areas of the UKCV:

H4L

Worldwide search of patent documents classified in the following areas of the IPC<sup>7</sup>:

H04Q

The following online and other databases have been used in the preparation of this search report:

WPI, EPODOC, JAPIO, INSPEC